

WHAT IS CLAIMED IS:

1. An installation system for installing an insert within an aperture in a workpiece, the workpiece having a first side and a second side, the insert being of the type in which a portion of the insert plastically deforms on the second side of the workpiece upon application of a linear force, the  
5 installation system comprising:
  - a tool body;
  - a nose piece attached to the tool body;
  - insert attachment means extending from the nose piece;
  - reciprocation means contained within the tool body connected to the insert attachment  
10 means;
  - a first electrode attached to the nose piece;
  - a second electrode for connecting to the workpiece;
  - current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode; and
  - 15 activation means for activating the reciprocation means and the current generation means.
2. The installation system of claim 1 wherein the insert attachment means comprises a threaded stud.
3. The installation system of claim 1 wherein the current generation means comprises a capacitor  
20 discharge welding machine.
4. The installation system of claim 1 wherein the current generation means comprises a resistance welding machine.
5. The installation system of claim 1 wherein the activation means comprises a trigger attached to the tool body, the trigger comprising an electrical contact which is activated upon manipulation  
25 of the trigger.
6. The installation system of claim 5 wherein the reciprocation means is pneumatically connected to pneumatic control means.
7. The installation system of claim 6 wherein the electrical contact is electrically connected to

processing means, the processing means capable of receiving input signals and generating output signals.

8. The installation system of claim 1 wherein the activation means comprises a trigger attached to the tool body, the trigger operating an air valve.
- 5 9. The installation system of claim 7 wherein the processing means is electrically connected to the current generation means and to the pneumatic control means.
10. The installation system of claim 9 wherein the processing means, upon activation of the electrical contact, provides an output signal to the current generation means and to the pneumatic control means.
- 10 11. The installation system of claim 1 wherein the nose piece comprises a rear member adjacent to the tool body, an intermediate member adjacent to the rear member, the intermediate member comprising an insulation material, and a front member adjacent to the intermediate member, the first electrode attached to the front member.
12. The installation system of claim 11 wherein the rear member comprises aluminum.
- 15 13. The installation system of claim 11 wherein the front member comprises copper.
14. The installation system of claim 11 wherein the front member comprises copper alloy.
15. The installation system of claim 11 wherein the intermediate member comprises a thermoplastic material.
16. An installation system for installing an insert within an aperture in a workpiece, the workpiece  
20 having a first side and a second side, the insert being of the type in which a portion of the insert plastically deforms on the second side of the workpiece upon application of a linear force, the installation system comprising:
  - a tool body;
  - a nose piece attached to the body;
  - 25 insert attachment means extending from the nose piece;
  - reciprocation means contained within the tool body connected to the insert attachment means;
  - a first electrode attached to the nose piece;

a second electrode for connecting to the workpiece;

current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode;

a first activation means for activating the reciprocation means; and

5 a second activation means for activating the current generation means.

17. The installation system of claim 16 wherein the insert attachment means comprises a threaded stud.

18. The installation system of claim 16 wherein the current generation means comprises a capacitor discharge welding machine.

10 19. The installation system of claim 16 wherein the current generation means comprises a resistance welding machine.

20. The installation system of claim 16 wherein the first activation means comprises a first trigger attached to the tool body, the first trigger comprising a first electrical contact which is activated upon manipulation of the first trigger.

15 21. The installation system of claim 20 wherein the reciprocation means is pneumatically connected to pneumatic control means.

22. The installation system of claim 21 wherein the first electrical contact is electrically connected to the pneumatic control means, wherein the pneumatic control means is activated when the first electrical contact is activated.

20 23. The installation system of claim 16 wherein the second activation means comprises a second trigger attached to the tool body, the second trigger comprising a second electrical contact which is activated upon manipulation of the second trigger.

24. The installation system of claim 23 wherein the second electrical contact is electrically connected to the current generation means, wherein the current generation means is activated  
25 when the second electrical contact is activated.

25. The installation system of claim 16 wherein the first activation means comprises a first trigger attached to the tool body, the a first trigger connected to an air valve which operates upon manipulation of the first trigger.

26. The installation system of claim 25 wherein the air valve is connected to the pneumatic control means, wherein the pneumatic control means is activated when the air valve is operated.
27. The installation system of claim 16 wherein the nose piece comprises a rear member adjacent to the body, an intermediate member adjacent to the rear member, the intermediate member comprising an insulation material, and a front member adjacent to the intermediate member, the first electrode attached to the front member.
28. The installation system of claim 27 wherein the rear member comprises aluminum.
29. The installation system of claim 27 wherein the front member comprises copper.
30. The installation system of claim 27 wherein the front member comprises copper alloy.
31. The installation system of claim 27 wherein the intermediate member comprises a thermoplastic material.
32. An installation system for installing an insert within an aperture in a workpiece, the workpiece having a first side and a second side, the insert being of the type in which a portion of the insert plastically deforms on the second side of the workpiece upon application of a linear force, the installation system comprising:
- a tool body, comprising a linear pull housing connected to a motor section;
  - a nose piece attached to the linear pull housing;
  - insert attachment means extending from the nose piece;
  - reciprocation means contained within the tool body connected to the insert attachment means;
  - a first electrode attached to the nose piece;
  - a second electrode for connecting to the workpiece;
  - current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode; and
  - activation means for activating the reciprocation means and the current generation means.
33. The installation system of claim 32 wherein the insert attachment means comprises a threaded stud.

34. The installation system of claim 32 wherein the current generation means comprises a capacitor discharge welding machine.
35. The installation system of claim 32 wherein the current generation means comprises a resistance welding machine.
- 5 36. The installation system of claim 32 wherein the activation means comprises a trigger attached to the tool body, the trigger comprising an electrical contact which is activated upon manipulation of the trigger.
37. The installation system of claim 36 wherein the reciprocation means is pneumatically connected to pneumatic control means.
- 10 38. The installation system of claim 37 wherein the electrical contact is electrically connected to processing means, the processing means capable of receiving input signals and generating output signals.
39. The installation system of claim 38 wherein the processing means is electrically connected to the current generation means and to the pneumatic control means.
- 15 40. The installation system of claim 39 wherein the processing means, upon activation of the electrical contact, provides an output signal to the current generation means and to the pneumatic control means.
41. The installation system of claim 32 wherein the first activation means comprises a first trigger attached to the tool body, the a first trigger connected to an air valve which operates upon manipulation of the first trigger.
- 20 42. The installation system of claim 41 wherein the air valve is connected to the pneumatic control means, wherein the pneumatic control means is activated when the air valve is operated.
43. The installation system of claim 32 wherein the nose piece comprises a rear member adjacent to the linear pull housing, an intermediate member adjacent to the rear member, the intermediate member comprising an insulation material, and a front member adjacent to the intermediate member, the first electrode attached to the front member.
- 25 44. The installation system of claim 43 wherein the rear member comprises aluminum.
45. The installation system of claim 43 wherein the front member comprises copper.

46. The installation system of claim 43 wherein the front member comprises copper alloy.
47. The installation system of claim 43 wherein the intermediate member comprises a thermoplastic material.

48. A method for installing an insert within an aperture in a workpiece, the insert comprising a sleeve member and an integral flange, the flange having a larger diameter than the aperture and the workpiece having a first side and a second side, the method comprising:

- (a) attaching the insert to a tool body, the flange adjacent to a nose piece attached to the tool body, the tool body being one component of an insert installation system comprising: (i) the tool body; (ii) the nose piece attached to the body; (iii) insert attachment means extending from the nose piece; (iv) reciprocation means within the tool body connected to the insert attachment means; (v) a first electrode attached to the nose piece; (vi) a second electrode for connecting to the workpiece; (vii) current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode; and (viii) activation means for activating the reciprocation means and the current generation means;
- (b) attaching the second electrode to the workpiece;
- (c) inserting the insert into the aperture until the flange of the insert is sandwiched between and touching the first side of the workpiece on one side and by the nose piece on the other side;
- (d) engaging the activation means, whereby a portion of the sleeve on the second side of the work piece is enlarged by the reciprocation means and the flange is fused to the first side by the current generation means; and
- (e) disengaging the insert attachment means from the installed insert.

49. A method for installing an insert within an aperture in a workpiece, the insert comprising a sleeve member and an integral flange, the flange having a larger diameter than the aperture and the workpiece having a first side and a second side, the method

comprising:

- (a) attaching the insert to a tool body, the flange adjacent to a nose piece attached to the tool body, the tool body being one component of an insert installation system comprising: (i) the tool body; (ii) the nose piece attached to the body; (iii) insert attachment means extending from the nose piece; (iv) reciprocation means within the tool body connected to the insert attachment means; (v) a first electrode attached to the nose piece; (vi) a second electrode for connecting to the workpiece; (vii) current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode; (viii) a first activation means for activating the reciprocation means; and (ix) a second activation means for activating the current generation means;
- (b) attaching the second electrode to the workpiece;
- (c) inserting the insert into the aperture until the flange of the insert is sandwiched between and touching the first side of the workpiece on one side and by the nose piece on the other side;
- (d) engaging the first activation means, whereby the reciprocation means is activated and a portion of the sleeve on the second side of the work piece is enlarged;
- (e) engaging the second activation means, whereby the current generation means is activated and the flange is fused to the first side; and
- (f) disengaging the insert attachment means from the installed insert.

50. A method for installing an insert within an aperture in a workpiece, the insert comprising a sleeve member and an integral flange, the flange having a larger diameter than the aperture and the workpiece having a first side and a second side, the method comprising:

- (a) attaching the insert to a tool body, the flange adjacent to a nose piece attached

to the tool body, the tool body being one component of an insert installation system comprising: (i) the tool body; (ii) the nose piece attached to the body; (iii) insert attachment means extending from the nose piece; (iv) reciprocation means within the tool body connected to the insert attachment means; (v) a first electrode attached to the nose piece; (vi) a second electrode for connecting to the workpiece; (vii) current generation means connected to the first electrode and the second electrode for creating an electrical current between the first electrode and the second electrode; (viii) a first activation means for activating the reciprocation means; and (ix) a second activation means for activating the current generation means;

- (b) attaching the second electrode to the workpiece;
- (c) inserting the insert into the aperture until the flange of the insert is sandwiched between and touching the first side of the workpiece on one side and by the nose piece on the other side;
- (d) engaging the second activation means, whereby the current generation means is activated and the flange is fused to the first side;
- (e) engaging the first activation means, whereby the reciprocation means is activated and a portion of the sleeve on the second side of the work piece is enlarged; and
- (f) disengaging the insert attachment means from the installed insert.